

REMARKS

Applicant thanks the Examiner for the very thorough consideration given the present application. In view of the above amendment, applicant believes the pending application is in condition for allowance.

Claims 1, 2, 5, 6, 8-12, 14, 15 and 18-21 are now present in this application. Claims 1, 8 and 18 are independent. Claims 1, 8 and 9 have been amended and claims 13, claims 19-21 have been added, and 17 have been canceled by the present amendment. Reconsideration of this application, as amended, is respectfully requested.

Claim Objections

The Examiner has objected to claim 9 because there is no previous determination of the position in prior claims from which the position error could be compensated. In order to overcome this objection, Applicant has amended claim 9 to recite, "the microcomputer compensates a position error of the mobile robot generated by sliding of the wheel or idle rotation based on the estimated position of the mobile robot." Therefore, amended claim 9 clarifies that the position error is generated by sliding of the wheel or idle rotation based on the estimated position of the mobile robot. Accordingly, reconsideration and withdrawal of this objection are respectfully requested.

Rejection Under 35 U.S.C. § 103

Claims 1, 2, 5, 6, 8-15, 17 and 18 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over De Bruyne in view of Passey and Lee et al. This rejection is respectfully traversed.

Independent claim 1 has been amended to recite, among other features, "storing position numbers for discriminating positions of a plurality of ultrasonic signal reception units," "oscillating ultrasonic signals sequentially using a plurality of ultrasonic signal oscillating units of a charging station after receiving a radio frequency (RF) signal emitted at preset time intervals from the mobile robot," and "detecting a proceeding direction of the mobile robot by receiving

the ultrasonic signals.” Independent claim 17 has been amended to recite, among other features, “the microcomputer further comprises a storing unit configured to store position numbers for discriminating positions of the plurality of ultrasonic signal reception units, and detects a direction that the mobile robot proceeds through the stored position number of the ultrasonic signal reception unit which has received the ultrasonic signal first among the plurality of ultrasonic signal reception units.”

The Office Action states that the features of “prestoring position numbers for discriminating positions of at least one or more ultrasonic signal reception units for receiving the ultrasonic signals, among a plurality of ultrasonic signal reception units” do not read on De Bruyne or Passey, but reads on Lee et al. (see page 5 of the Office Action). Bruyne and Passey do not teach storing any information related to positions, and thus Bruyne and Passey fail to teach storing position numbers for discriminating positions of a plurality of ultrasonic signal reception units. Further, Lee et al. teaches having a first receiving unit including at least two sound sensors receiving the sound wave, and a second receiving unit which receives the synchronizing signal incident onto the robot (see paragraph [0011] of Lee et al.). However, Lee also does not disclose storing any information related to positions. Rather, Lee et al. only teaches estimating the current position and the orientation of the robot with respect to the docking station using the distance, the incident angle and the positional change (see paragraph [0047] of Lee et al.). Therefore, Lee et al. also does not teach storing position numbers for discriminating positions of a plurality of ultrasonic signal reception units, as recited in amended independent claims 1 and 8. In addition, Lee does not teach position numbers for discriminating positions of at least one or more ultrasonic signal reception units, and thus Lee does not teach the use of position numbers as claimed in independent claims 1 and 8. Hence, the cited references fail to teach or suggest these features of amended independent claims 1 and 8.

Further, the Office Action states that De Bruyne and Passey teach the features of “calculating time taken for each ultrasonic signal generated by a plurality of ultrasonic signal oscillating units of a charging station to reach the mobile robot, wherein the ultrasonic signals are oscillated sequentially after receiving a radio frequency (RF) signal emitted at preset time intervals from the mobile robot” (see pages 3-4 of the Office Action). De Bruyne teaches

successively measuring the traveling times of the ultrasonic pulses 1 from the ultrasound transmitters 1 and 2 of the base station B to the ultrasound receiver of the mouse M (see col. 2, lines 66-68 of De Bruyne). However, De Bruyne does not teach that the ultrasonic pulses are sequentially oscillated, but rather only teaches that the traveling times of the ultrasonic pulses are successively measured. Further, De Bryune does not teach that the ultrasonic signals are sequentially oscillated after receiving an RF signal emitted at preset time intervals. Although Passey teaches that the radio transmission may be transmitted in intervals (see col. 2, lines 27-30 of Passey), Passey still does not teach or suggest that the ultrasonic signals are sequentially oscillated after receiving an RF signal emitted at preset time intervals. In addition, although Lee et al. teaches two transmitting units to transmit supersonic waves and the sound sensors receiving the supersonic waves, Lee et al. fails to teach sequentially transmitting the supersonic waves after receiving an RF signal emitted at preset intervals. Therefore, the cited references fail to teach or suggest oscillating ultrasonic signals sequentially using a plurality of ultrasonic signal oscillating units of a charging station after receiving a radio frequency (RF) signal emitted at preset time intervals from the mobile robot, as recited in independent claim 1. For the similar reasons, the cited references fail to teach or suggest a control unit configured to control the ultrasonic signal oscillating units so that the ultrasonic signals are oscillated sequentially whenever the RF signal is received by the RF reception unit, as recited in independent claims 8 and 18.

In addition, the cited references are silent as to detecting a proceeding direction of the mobile robot by receiving the ultrasonic signals. Although the cited references are directed to estimating the position of a moving unit, the cited references do not teach or suggest detecting a proceeding direction of the mobile robot by receiving the ultrasonic signals, as recited in independent claims 1 and 8.

Accordingly, it is respectfully submitted that amended independent claims 1, 8 and 18 and each of the claims depending therefrom are allowable.

Claims Added

Claims 19-21 have been added for the Examiner's consideration. Applicant submits that claims 19-21 depend, either directly or indirectly, from independent claims 1, 8 and 18, respectively, and are therefore allowable based on their dependence from claims 1, 8 and 18 which are believed to be allowable. In addition, claims 19-21 recite further limitations which are not disclosed or made obvious by the applied prior art references.

Consideration and allowance of claims 19-21 are respectfully requested.

Conclusion

All of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicants therefore respectfully request that the Examiner reconsider all presently outstanding rejections and that they be withdrawn. It is believed that a full and complete response has been made to the outstanding Office Action, and as such, the present application is in condition for allowance.

The Examiner is respectfully requested to enter this Amendment After Final, in that it raises no new issues but merely places the claims in a form more clearly patentable over the references of record. In the alternative, the Examiner is respectfully requested to enter this Amendment After Final in that it reduces the issues for appeal.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Mr. Jun S. Ha, Reg. No. 58,508 at the telephone number of the undersigned below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37.C.F.R. §§1.16 or 1.17; particularly, extension of time fees.

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Respectfully submitted,

By 

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